

CLAIMS

1. A digital wireless loudspeaker system comprising:
an audio transmission device including-
means for receiving input digital audio data,
means for obtaining an audio sample clock synchronized to the
input digital audio data,
5 means for generating transmission data based upon the input
digital audio data,
means for generating an RF transmission clock based upon the
audio sample clock, and
10 means for transmitting an RF signal based upon the
transmission data and the transmission clock; and
a wireless speaker for receiving the RF signal and broadcasting
sound based upon the received RF signal, including-
means for generating a derived sample clock based upon the
15 transmission clock,
means for generating output audio data based upon the
transmission data, and
means for broadcasting sound based upon the output audio data.
2. The system of claim 1, wherein the means for obtaining an
audio sample clock comprises means for receiving a discrete input
audio sample clock associated with the input audio data.
3. The system of claim 1, wherein the means for obtaining an

audio sample clock comprises means for deriving the audio sample clock from the input audio data.

4. The system of claim 1, wherein the RF signal is transmitted continuously as a real time data stream.
5. The system of claim 1, wherein the RF signal includes status data.
6. The system of claim 5, wherein the status data includes a control signal for activating the wireless speaker.
7. The system of claim 5, wherein the status data includes a control signal for controlling volume of the broadcast sound.
8. The system of claim 5, wherein the speaker includes means for equalizing the broadcast sound, and the status data includes a control signal for controlling equalization means.
9. The system of claim 1, wherein the RF signal includes two channels of audio data, and further including means for selecting a channel for the speaker to broadcast.
10. The system of claim 1, wherein the RF signal includes two channels of audio data, and a channel of status data.

11. The system of claim 10, wherein the means for transmitting transmits two RF signals at two different frequencies, each RF signal based upon one of the transmission data audio channels.

12. The system of claim 10, further including means for multiplexing the two channels of audio transmission data and the status channel prior to transmission, and means for demultiplexing the received RF signal,

13. The system of claim 1, further including means for assigning the speaker to a speaker group and means for selectively activating the speaker based on the speaker group assigned to it.

14. The system of claim 1, wherein the RF signal includes frame markers, and further including means for synchronizing the speaker based upon the frame marker.

15. A digital wireless loudspeaker system comprising:
an audio transmission device including-

means for receiving input digital audio data,

means for generating two audio channels of transmission data

5 based upon the input digital audio data, and

means for transmitting an RF signal based upon the

transmission data channels; and

a wireless speaker for receiving the RF signal and broadcasting

sound based upon the received RF signal, including-

10 means for selecting one of the audio channels from the RF
signal for broadcast,

means for generating an output audio signal based upon the
selected channel; and

means for broadcasting sound based upon the output audio
15 signal.

16. The system of claim 15, wherein the means for selecting
comprises:

a manual switch at the speaker for selecting which audio
channel the speaker will broadcast; and

5 means for choosing one of the audio channels based upon the
manual switch.

17. The system of claim 15, further comprising:

a manual switch for assigning the speaker to a speaker group;
and

means for selectively activating the speaker based on the
5 speaker group assigned to it by the switch.

18. The system of claim 15, wherein the RF signal includes a control signal for controlling which audio channel the speaker will broadcast, comprising:

means at the speaker for choosing which audio channel the
5 speaker will broadcast based upon the control signal.

D 19. The system of claim 18, further comprising:

means for assigning the speaker to a speaker group; and
wherein the RF signal further includes a control signal for
selectively activating the speaker based upon the
5 speaker group assigned to it.

20. The system of claim 15, wherein the RF signal includes frame markers, and further including means for synchronizing the speaker based upon the frame markers.

21. The system of claim 15, wherein:

the audio transmission device means for receiving further
includes

means for receiving input digital audio data,

5 means for obtaining an audio sample clock synchronized
to the input digital audio data,

means for generating an RF transmission clock based

upon the audio sample clock, .
the means for transmitting transmits an RF signal based
10 upon the transmission data and the transmission
clock; and
the wireless speaker further includes-
means for generating a derived sample clock based upon
the transmission clock, and
15 the means for broadcasting broadcasts sound
synchronized to the derived sample clock.

22. The system of claim 21, wherein the means for obtaining an
audio sample clock comprises means for receiving a discrete input
audio sample clock associated with the input audio data.

23. The system of claim 21, wherein the means for obtaining an
audio sample clock comprises means for deriving the audio sample
clock from the input audio data.

24. The system of claim 15, wherein the means for transmitting
transmits two RF signals at two different frequencies, each RF
signal based upon one of the transmission data audio channels, and
wherein the means for selecting one of the channels comprises
5 means for tuning in to the frequency associated with the appropriate
RF signal.

25. The system of claim 15, further including means for

multiplexing the two channels of audio transmission data prior to transmission, and means for demultiplexing the received RF signal prior to selecting the audio channel.

26. A digital wireless loudspeaker system comprising:
an audio transmission device including-

- means for receiving input digital audio data,
- means for generating RF transmission data based upon the
input digital audio data and including frame markers
appearing at fixed intervals in the RF transmission data,
and

- means for transmitting an RF signal based upon the RF
transmission data; and

at least two wireless speakers for receiving the RF signal and

broadcasting sound based upon the received RF signal, each
speaker including-

- means for generating an output audio signal based upon the
received RF signal,

- means for synchronizing each output audio signal based upon
the frame markers, and

- means for broadcasting sound based upon the synchronized
output audio signals.

27. The system of claim 26, wherein the input digital audio data
comprises digital audio samples in the form of a digital audio bit-
stream, and wherein the frame markers are positioned within the
bitstream with a temporal accuracy of at least one audio data
sample.

28. The system of claim 27, wherein the frame markers are

positioned within the bitstream with a temporal accuracy at least on the order of an audio data bit from said bit-stream.

29. The system of claim 28, wherein:

the audio transmission device means for receiving further includes -

means for receiving an input audio sample clock

5 associated with the input digital audio data, and

means for generating an RF transmission clock based upon the input audio sample clock,

wherein the means for transmitting transmits an RF signal based upon the transmission data and the transmission clock;

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the wireless speaker further includes -

means for generating a derived digital audio sample clock based upon the transmission clock,

wherein the means for generating a derived digital audio sample clock is further responsive to the frame markers, such that the phase of the derived sample clock is accurate to within at least on the order of a data bit from the bit-stream; and

15

the means for broadcasting broadcasts sound synchronized to the derived sample clock.

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30. The system of claim 27, wherein:

the audio transmission device means for receiving further

includes -

means for receiving an input audio sample clock,

5 associated with the input digital audio data, and

means for generating an RF transmission clock based

upon the input audio sample clock,

wherein the means for transmitting transmits an RF

signal based upon the transmission data and the

10 transmission clock; and

the wireless speaker further includes-

means for generating a derived digital audio sample

clock based upon the transmission clock, wherein

the means for generating a derived digital audio

15 sample clock is further responsive to the frame

markers, such that the phase of the digital audio

sample clock is accurate to within at least one

audio sample, and

wherein the means for broadcasting broadcasts sound

20 synchronized to the derived sample clock.

31. The system of claim 26, wherein the RF signal further includes an RF transmission clock.

32. The system of claim 31, wherein the input digital audio data further includes an input sample clock, and the RF transmission clock is based upon the input sample clock.

wherein the RF signal further includes a control signal for
selectively activating the speaker based upon the
speaker group assigned to it.

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33. The system of claim 32, wherein the frame markers are positioned within the bit-stream with a temporal accuracy at least on the order of one clock cycle from the RF transmission clock.

34. The system of claim 26, wherein the RF signal includes at least two audio channels of data, the system further including means for selecting which audio channel each speaker will broadcast.

35. The system of claim 34 wherein the audio channel selecting means comprises a manual switch at each speaker.

36. The system of claim 35 further comprising:
a manual switch at each speaker for assigning the associated speaker to a speaker group; and
means for selectively activating each speaker based on the speaker group assigned to it by the associated switch.

37. The system of claim 34, wherein the RF signal includes a control signal for controlling which audio channel each speaker will broadcast, and further comprising:

means at the speaker for choosing which audio channel the speaker will broadcast based upon the control signal.

38. The system of claim 37, further comprising:
means for assigning the speaker to a speaker group; and

39. A digital wireless loudspeaker system comprising:

an audio transmission device including-

means for receiving input digital audio data,

means for generating two audio channels of transmission

5 data based upon the input digital audio data,

means for multiplexing the two audio channels; and

means for transmitting an RF signal based upon the

multiplexed transmission data channels, and

a wireless speaker for receiving the RF signal and

10 broadcasting sound based upon the received RF signal,

including-

means for demultiplexing the received RF signal;

means for selecting one of the audio channels from the

demultiplexed signal for broadcast,

15 means for generating an output audio signal based upon

the selected audio channel, and

means for broadcasting sound based upon the output

audio signal.

40. The system of claim 39, wherein the RF signal includes status data.

41. The system of claim 40, wherein the status data includes a control signal for activating the wireless speaker.

42. The system of claim 40, wherein the status data includes a

control signal for controlling volume of the broadcast sound.

43. The system of claim 40, wherein the speaker includes means for equalizing the broadcast sound, and the status data includes a control signal for controlling the equalization means.

44. The system of claim 39 wherein the audio channel selecting means comprises a manual switch at each speaker.

45. The system of claim 44 further comprising:
a manual switch at each speaker for assigning the associated
speaker to a speaker group; and
means for selectively activating each speaker based on the
5 speaker group assigned to it by the associated switch.

46. The system of claim 39, wherein the RF signal includes a control signal for controlling which audio channel each speaker will broadcast, and further comprising:

5 means at the speaker for choosing which audio channel the
speaker will broadcast based upon the control signal.

47. The system of claim 46, further comprising:
means for assigning the speaker to a speaker group; and
wherein the RF signal further includes a control signal for
selectively activating the speaker based upon the
5 speaker group assigned to it.

48. The system of claim 39, further including means for assigning the speaker to a speaker group and means for selectively activating the speaker based on the speaker group assigned to it.

49. A digital wireless loudspeaker system comprising:

an audio transmission device including-

means for receiving input digital audio data,

means for generating transmission data based upon the

5 input digital audio data,

means for generating speaker group data for selectively

indicating speakers to be activated; and

means for transmitting an RF signal based upon the

transmission data and the speaker group data; and

10 a wireless speaker for receiving the RF signal and

broadcasting sound based upon the received RF signal,

including-

means for assigning the speaker to a speaker group,

means for selectively activating the speaker according

15 to the speaker group data,

means for generating an output audio signal based upon

the RF signal, and

means for broadcasting sound based upon the output

audio signal.

50. The system of claim 49 wherein the speaker group assigning means comprises a manual switch at the speaker.

51. The system of claim 49 wherein the RF signal further includes speaker group assigning data, and the speaker group assigning means comprises means for selectively activating the speaker based upon

the speaker group assigning data.

52. The system of claim 49, wherein the RF signal includes frame markers, and further including means for synchronizing the speaker based upon the frame marker.

53. The system of claim 49, wherein:

the audio transmission device means for receiving further

includes -

means for receiving an input audio sample clock

5 associated with the input digital audio data, and

means for generating an RF transmission clock based

upon the input audio sample clock, and

wherein the means for transmitting transmits an RF

signal based upon the transmission data, the

10 speaker group data, and the transmission clock; and

the wireless speaker further includes-

means for generating a derived sample clock based upon

the transmission clock, and

the means for broadcasting broadcasts sound

15 synchronized to the derived sample clock.